

Chemical Analysis Report

WQAP-2022-06-16-01

Florida Department of Environmental Protection
Central Laboratory
2600 Blair Stone Road
Tallahassee, FL 32399-2400
DOH Accreditation E31780

Event Description: **Algal Bloom Response -SOROC**
Request ID: **RQ-2022-03-07-14**
Customer: **WQAP**
Project ID: **BLOOM-RESP**

Send Reports to:
FL Dept. of Environmental Protection
2295 Victoria AVE
Suite 364
Fort Myers, FL 33901
Attn: Kirby Wolfe

For additional information please contact
Colin Wright, Ph.D.
Liang-Tsair Lin, Ph.D.
Kerry Tate, Ph.D.
Dr. rer. nat. Bettina Steinbock
Thekkekalathil Chandrasekhar, Ph.D, QA Officer
Phone (850) 245-8085

Certified by: Thekkekalathil Chandrasekhar, Environmental Consultant

Date Certified: 07-JUL-2022 15:47



Case Narrative

Unless otherwise noted, all samples included in this report were received in accordance with protocols referenced in Chapter 62-160, Florida Administrative Code (F.A.C.). Results published in this report pertain only to the samples as submitted to, and received by the laboratory. All times in this report are adjusted to the applicable Eastern Time Zone (EST or EDT).

Results for the following analytical groups are included in this report: Nutrients and Pesticides.

Scientific notation may be used in reporting very large or small values. Values reported using scientific notation will take the form of the following example: 1.3E+03, which is equivalent to 1.3×10^3 or 1300.

Unless otherwise noted, analytical values for soil and sediment samples are reported on a dry weight basis, and analytical values for waste and tissue samples are reported on a wet weight basis.

Results for TNI accredited tests met requirements established by The NELAC Institute. A double asterisk (**) is used to indicate an analyte/matrix/method for which the laboratory is not TNI accredited by the Florida Department of Health Environmental Laboratory Certification Program or where accreditation for that field of testing is not applicable.

Any significant anomalies or deviations from established protocols are documented in Non-Conformance Reports, which, where appropriate, are included within this analytical report. Additional comments related to specific analytical tests may be included as remarks following the analytical results for each sample. Such comments and remarks are for informational purposes only and are not intended to convey judgement about the usability of the reported data.

A quality control report on the performance of the test method for the submitted samples is included. Uncertainty associated with the analytical results contained in this report can be estimated from the reported quality assurance results and from published quality control acceptance limits for each analytical test. Matrix quality control results (matrix spike recoveries and matrix sample precision) pertain only to the matrix sample tested and do not necessarily reflect test method performance for other samples.

Typical matrix quality control (QC) measurements may include matrix spike recovery, matrix spike duplicate recovery, matrix spike precision and matrix sample precision. Not all matrix QC results may be available or reportable; where they are not an explanation is provided. Typical reasons for unavailable QC results include, but are not limited to, a) insufficient matrix sample to perform some or all QC measurements; b) analyte concentration in the sample replicated was too low for a meaningful measurement of precision and c) analyte concentration in the matrix sample spiked was too high (relative to the amount of analyte spiked) for a meaningful measurement of recovery. Where matrix QC results are unavailable, other method performance metrics (e.g., LCS recovery, LCS precision, surrogate recovery) may be used to assess performance of the method. Comments explaining any missing QC measurements are not intended to convey any adverse conclusions about the quality of the reported data.

Precision is reported as relative percent difference unless otherwise noted.

Quality Control codes as defined below may be used in this report to indicate results that are associated with one or more quality control elements which did not fall within established test method criteria. Such results may be qualified as estimates using a J qualifier as required by 62-160 F.A.C. Explanations are included in the report for any results that were reported as estimates for other reasons.

QC Codes used in this report may include:

- LCS – Recovery for the batch Laboratory Control Sample (LCS) was outside existing control limits;
- MS – Recovery for the batch matrix spike (MS) was outside existing control limits;
- CCV – Recovery for a continuing calibration verification (CCV) standard was outside existing control limits;
- SUR – Recovery of a surrogate (SUR) for associated analytes was outside existing control limits;
- RPD – The precision, measured as relative percent difference (RPD), of batch replicate measurements was outside existing control limits;
- RSD – The precision, measured as relative standard deviation (RSD), of batch replicate measurements was outside existing control limits;
- SMP – Sample - used precision derived from replicate analyses of a sample;

The following data qualifiers are used, where applicable, in this report as specified in 62-160 F.A.C.

- A - Value reported is the mean of two or more determinations.
- B - Results based on colony counts outside the acceptable range.
- I - The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
- J - Estimated value and/or the analysis did not meet established quality control criteria.
- K - Actual value is known to be less than value given.
- L - Actual value is known to be greater than value given.
- N - Presumptive evidence of presence of material.
- O - Sampled, but analysis lost or not performed.
- Q - Sample held beyond normal holding time.
- T - Value reported is less than the criterion of detection.
- U - Material was analyzed for but not detected. The reported value is the method detection limit for the sample analyzed.
- V - Analyte was detected in both sample and method blank.
- X - Too few individuals to calculate SCI value.
- Y - The laboratory analysis was from an unpreserved or improperly preserved sample. The data may not be accurate.
- Z - Colonies were too numerous to count (TNTC).

Quality control information from overflow laboratories may not be included in this report. Please refer to the associated report from the overflow laboratory for additional information.

Sample Location: Caloosahatchee River - Moody Canal

Collection Date/Time: 06/15/2022 10:25

Field ID: HAB-SD-06152022-1025

Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2335013	EPA 8321B	Anatoxin-a	0.25	U	ug/L	P415238	
		Cylindrospermopsin	0.10	U	ug/L	P415238	
		Desmethyl microcystin LR	0.25	U	ug/L	P415238	
		Microcystin HIR**	0.25	U	ug/L	P415238	
		Microcystin HtyR**	0.25	U	ug/L	P415238	
		Microcystin LA	0.10	U	ug/L	P415238	
		Microcystin LF	0.10	U	ug/L	P415238	
		Microcystin LR	0.25	U	ug/L	P415238	
		Microcystin LW	0.25	U	ug/L	P415238	
		Microcystin LY	0.10	U	ug/L	P415238	
		Microcystin RR	0.10	U	ug/L	P415238	
		Microcystin WR	0.50	U	ug/L	P415238	
		Microcystin YR	0.25	U	ug/L	P415238	
		Nodularin-R**	0.10	U	ug/L	P415238	
2335014	EPA 350.1 Rev. 2.0	Ammonia-N	0.008		mg N/L	P415825	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	0.96		mg N/L	P415709	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.006	I	mg N/L	P416015	
	EPA 365.1 Rev. 2.0	Total-P	0.094		mg P/L	P415615	
2335015	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.060		mg P/L	P415365	

Quality Assurance Report Method Blank Results

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P415825

Component	Result	Code	Units
Ammonia-N	0.002	U	mg N/L

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P415709

Component	Result	Code	Units
Kjeldahl Nitrogen	0.080	U	mg N/L

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P416015

Component	Result	Code	Units
NO2NO3-N	0.004	U	mg N/L

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P415615

Component	Result	Code	Units
Total-P	0.002	U	mg P/L

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P415365

Component	Result	Code	Units
O-Phosphate-P	0.004	U	mg P/L

Reference Method: EPA 8321B
Batch ID: P415238

Component	Result	Code	Units
Anatoxin-a	0.25	U	ug/L
Cylindrospermopsin	0.10	U	ug/L
Desmethyl microcystin LR	0.25	U	ug/L
Microcystin HIR	0.25	U	ug/L
Microcystin HtyR	0.25	U	ug/L
Microcystin LA	0.10	U	ug/L
Microcystin LF	0.10	U	ug/L
Microcystin LR	0.25	U	ug/L
Microcystin LW	0.25	U	ug/L
Microcystin LY	0.10	U	ug/L
Microcystin RR	0.10	U	ug/L
Microcystin WR	0.50	U	ug/L
Microcystin YR	0.25	U	ug/L
Nodularin-R	0.10	U	ug/L

Quality Assurance Report Laboratory Control Sample Accuracy

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P415825

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Ammonia-N	96.6		P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P415709

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Kjeldahl Nitrogen	107		P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P416015

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
NO2NO3-N	99.5		P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P415615

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Total-P	106		P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P415365

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
O-Phosphate-P	101		P	90 - 110

Reference Method: EPA 8321B
Batch ID: P415238

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Anatoxin-a	97.3		P	40 - 150
Cylindrospermopsin	95.6		P	40 - 150
Desmethyl microcystin LR	90.5		P	40 - 150
Microcystin HIR	92.4		P	40 - 150
Microcystin HtyR	98.7		P	40 - 150
Microcystin LA	99.7		P	40 - 150
Microcystin LF	90.8		P	40 - 150
Microcystin LR	85.5		P	40 - 150
Microcystin LW	87.6		P	40 - 150
Microcystin LY	90.4		P	40 - 150
Microcystin RR	95.7		P	40 - 150
Microcystin WR	88.2		P	40 - 150
Microcystin YR	84.2		P	40 - 150
Nodularin-R	87.7		P	40 - 150

Quality Assurance Report Matrix Spike Accuracy

Reference Method: EPA 350.1 Rev. 2.0

Batch ID: P415825

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2334561	Ammonia-N	97.4	101	P/P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0

Batch ID: P415709

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2334886	Kjeldahl Nitrogen	90.2	91.4	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0

Batch ID: P416015

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2334955	NO2NO3-N	101	99.2	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0

Batch ID: P415615

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2335021	Total-P	99.9	103	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved

Batch ID: P415365

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2335109	O-Phosphate-P	96.8	95.0	P/P	90 - 110

Reference Method: EPA 8321B

Batch ID: P415238

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2333677	Anatoxin-a	110	111	P/P	40 - 150
2333677	Cylindrospermopsin	106	107	P/P	40 - 150
2333677	Desmethyl microcystin LR	97.1	97.8	P/P	40 - 150
2333677	Microcystin HiLR	96.0	99.3	P/P	40 - 150
2333677	Microcystin HtyR	95.9	95.6	P/P	40 - 150
2333677	Microcystin LA	102	103	P/P	40 - 150
2333677	Microcystin LF	97.8	98.2	P/P	40 - 150
2333677	Microcystin LR	87.1	91.0	P/P	40 - 150
2333677	Microcystin LW	81.1	82.2	P/P	40 - 150
2333677	Microcystin LY	85.3	90.3	P/P	40 - 150
2333677	Microcystin RR	91.8	93.3	P/P	40 - 150
2333677	Microcystin WR	83.8	87.7	P/P	40 - 150
2333677	Microcystin YR	86.1	91.2	P/P	40 - 150
2333677	Nodularin-R	93.4	97.3	P/P	40 - 150

Quality Assurance Report Precision

Reference Method: EPA 350.1 Rev. 2.0

Batch ID: P415825

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2334561	Ammonia-N	2.18	Spike	P	0 - 20

Reference Method: EPA 351.2 Rev. 2.0

Batch ID: P415709

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2334886	Kjeldahl Nitrogen	1.10	Spike	P	0 - 20

Reference Method: EPA 353.2 Rev. 2.0

Batch ID: P416015

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2334955	NO2NO3-N	1.46	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0

Batch ID: P415615

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2335021	Total-P	1.61	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0 dissolved

Batch ID: P415365

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2335109	O-Phosphate-P	1.44	Spike	P	0 - 20

Reference Method: EPA 8321B

Batch ID: P415238

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2333677	Anatoxin-a	1.48	Spike	P	0 - 30
2333677	Cylindrospermopsin	1.13	Spike	P	0 - 30
2333677	Desmethyl microcystin LR	0.725	Spike	P	0 - 30
2333677	Microcystin HtIR	3.39	Spike	P	0 - 30
2333677	Microcystin HtyR	0.394	Spike	P	0 - 30
2333677	Microcystin LA	0.770	Spike	P	0 - 30
2333677	Microcystin LF	0.378	Spike	P	0 - 30
2333677	Microcystin LR	4.39	Spike	P	0 - 30
2333677	Microcystin LW	1.27	Spike	P	0 - 30
2333677	Microcystin LY	5.61	Spike	P	0 - 30
2333677	Microcystin RR	1.66	Spike	P	0 - 30
2333677	Microcystin WR	4.55	Spike	P	0 - 30
2333677	Microcystin YR	5.85	Spike	P	0 - 30
2333677	Nodularin-R	4.08	Spike	P	0 - 30

Quality Assurance Report Precision

* Sample, spike and/or laboratory control sample precision (LCS) is reported.

Quality Assurance Report Surrogates

Lab Sample ID: 2335013
Field Sample ID: HAB-SD-06152022-1025

Reference Method	Surrogate	% Rec.	Pass/Fail	Control Limits
EPA 8321B	Microcystin LR ethyl-d5	88.4	P	30 - 160

Quality Assurance Report Calibration Verification

Reference Method: EPA 8321B
Run ID: A112879
Included Lab Sample IDs: 2335013

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Anatoxin-a	104	104	P/P	50 - 160
Cylindrospermopsin	102	108	P/P	60 - 160
Desmethyl microcystin LR	86.5	94.3	P/P	60 - 160
Microcystin H1R	95.3	96.6	P/P	60 - 160
Microcystin HtyR	98.8	103	P/P	60 - 160
Microcystin LA	103	102	P/P	50 - 160
Microcystin LF	90.7	94.6	P/P	60 - 160
Microcystin LR	88.2	87.4	P/P	60 - 160
Microcystin LW	91.0	88.8	P/P	60 - 160
Microcystin LY	90.3	92.6	P/P	60 - 160
Microcystin RR	94.7	95.1	P/P	60 - 160
Microcystin WR	97.3	95.3	P/P	60 - 160
Microcystin YR	89.0	89.1	P/P	60 - 160
Nodularin-R	91.7	86.0	P/P	60 - 160

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Run ID: A112898
Included Lab Sample IDs: 2335015

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
O-Phosphate-P	98.7	97.9	P/P	90 - 110

Reference Method: EPA 350.1 Rev. 2.0
Run ID: A113107
Included Lab Sample IDs: 2335014

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Ammonia-N	99.7	99.2	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Run ID: A113112
Included Lab Sample IDs: 2335014

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Total-P	102	101	P/P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0
Run ID: A113146
Included Lab Sample IDs: 2335014

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Kjeldahl Nitrogen	95.0	95.2	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Run ID: A113191
Included Lab Sample IDs: 2335014

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
NO2NO3-N	101	102	P/P	90 - 110

Quality Assurance Report

Calibration Verification

* Pass/Fail determinations are made for each bracketing calibration verification check.

Control limits for initial calibration checks may be different from those for continuing checks, depending on method requirements.

Where they are different, both control limits are provided.

Quality Assurance Report Summary

Ref. Method	Analyte	LCS % Recovery	MS % Recovery		LCS	Precision	MS
						SMP	
EPA 350.1 Rev. 2.0	Ammonia-N	96.6	97.4	101			2.18
EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	107	90.2	91.4			1.10
EPA 353.2 Rev. 2.0	NO ₂ NO ₃ -N	99.5	101	99.2			1.46
EPA 365.1 Rev. 2.0	Total-P	106	99.9	103			1.61
EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	101	96.8	95.0			1.44
EPA 8321B	Anatoxin-a	97.3	110	111			1.48
	Cylindrospermopsin	95.6	106	107			1.13
	Desmethyl microcystin LR	90.5	97.1	97.8			0.725
	Microcystin HiLR	92.4	96.0	99.3			3.39
	Microcystin HtyR	98.7	95.9	95.6			0.394
	Microcystin LA	99.7	102	103			0.770
	Microcystin LF	90.8	97.8	98.2			0.378
	Microcystin LR	85.5	87.1	91.0			4.39
	Microcystin LW	87.6	81.1	82.2			1.27
	Microcystin LY	90.4	85.3	90.3			5.61
	Microcystin RR	95.7	91.8	93.3			1.66
	Microcystin WR	88.2	83.8	87.7			4.55
	Microcystin YR	84.2	86.1	91.2			5.85
	Nodularin-R	87.7	93.4	97.3			4.08

Reference Method Descriptions

Method	Description	<u>Associated Samples</u>
EPA 350.1 Rev. 2.0	Ammonia in aqueous matrices as mg N/L	2335014
EPA 351.2 Rev. 2.0	Total Kjeldahl Nitrogen in aqueous matrices	2335014
EPA 353.2 Rev. 2.0	Nitrite/Nitrate in aqueous matrices as mg N/L	2335014
EPA 365.1 Rev. 2.0	Total Phosphorus in aqueous matrices as mg P/L	2335014
EPA 365.1 Rev. 2.0 dissolved	Ortho-phosphate, dissolved, in filtered, aqueous matrices as mg P/L	2335015
EPA 8321B	Microcystins in water matrices by HPLC/MS/MS	2335013

Preparation and Analysis Log

Ref. Method	Received Date	Prep Date/Time	Prepared By	Analysis Date/Time	Analyzed By	Associated Samples
EPA 350.1 Rev. 2.0	06/16/2022			06/27/2022 13:19	Ping Hua	2335014
EPA 351.2 Rev. 2.0	06/16/2022	06/27/2022 14:35	Samantha L Bates	06/28/2022 13:14	Alexandra J Mattheus	2335014
EPA 353.2 Rev. 2.0	06/16/2022			06/30/2022 09:59	Beverly Y. Sanders	2335014
EPA 365.1 Rev. 2.0	06/16/2022	06/24/2022 14:50	Simonne.V. Calhoun	06/27/2022 12:26	James L Waggeberby	2335014
EPA 365.1 Rev. 2.0 dissolved	06/16/2022			06/16/2022 17:14	Nathaniel J Jones	2335015
EPA 8321B	06/16/2022	06/16/2022 12:00	Manjita Shrestha	06/16/2022 21:11	Manjita Shrestha	2335013